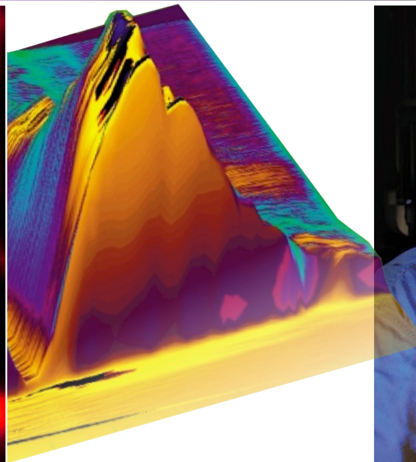
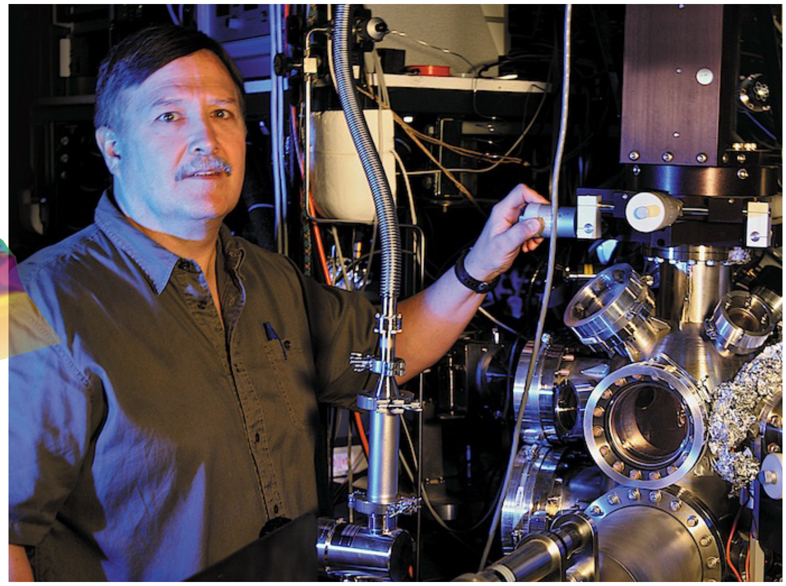
January 2013

MPA Materials Matter

INSIDE





Above left, photoelectron spectroscopy of plutonium. Right, John Joyce in the Laser Plasma Light Source.

> *"What we're trying to do is put plutonium—what may be the most complex element—on equal footing with our understanding of other materials."*

John Joyce

Up against a heavyweight trickster

By Diana Del Mauro, ADEPS Communications

For materials scientist John Joyce, plutonium is both an enigma and a source of inspiration.

Joyce leads a small team in Condensed Matter & Magnet Science (MPA-CMMS) that probes the electronic structure of materials. The team fills a rare niche, using a measurement technique called photoemission to study plutonium. Worldwide, the only researchers doing comparable studies on plutonium, he said, are in Karlsruhe, Germany.

Los Alamos scientists have been on a quest to comprehend plutonium's unusual properties ever since nuclear chemist Glenn Seaborg helped synthesize it in 1940. So far they've unraveled only a few of its secrets.

A trickster and a shape-shifter, the heavyweight metal changes its crystal structure six different ways, more than any other element in the periodic table. Depending on temperature, it can be as fragile as a ceramic, as malleable as a plastic, or as strong as cast iron. In powder form it can spontaneously burst into flames and vanish into thin air.

Seaborg declared plutonium "the first realization of the alchemist's dream of large-scale transmutation . . . the first synthetic element to be seen by man." It's an enigma of our making—that's the irony.

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"Thanks for all of your hard work over the past year. I look forward to a scientifically exciting and productive 2013 for MPA Division and the Laboratory."

Toni

From Toni's desk . . .

Happy New Year! I hope everyone had a great holiday break, despite the rather chilly weather around New Mexico. Thanks for all of your hard work over the past year. I look forward to a scientifically exciting and productive 2013 for MPA Division and the Laboratory.

I would like to update you on some of the upcoming events and issues, but first would like to highlight some of the recent news from people within MPA:

- Piotr Zelenay of MPA-11 won the 2012 Research Award presented by the Energy Technology Division of the Electrochemical Society.
- Fernando Garzon of MPA-11 won the 2012 LANL Fellow's Prize for Leadership.
- Jennifer Martinez of MPA-CINT was recently named a Fellow of the American Association for the Advancement of Science (AAAS).
- Jaqueline Kiplinger named ACS Organometallic Subdivision chair-elect.

Congratulations to all of you! Just a quick reminder: we have many distinguished scientists in the Laboratory and it is important for all of us to nominate our colleagues for fellowships and awards, where appropriate. The Division office is always willing to assist with such nominations—just ask us for help. Collectively, we benefit from having concrete evidence of the quality of MPA Division staff. On a related note, but sadly for us, we are losing one of our high-profile scientists. Tom Picraux's retirement party was last week. Tom has been CINT's Chief Scientist since its inception and has contributed significantly to CINT's success. We wish Tom well in the future and hope to see him back at LANL often.

We have also experienced recent success in our program development activities in MPA. New programs have been initiated with several different sponsors, including ARPA-E, DNDO, NIH, and EERE. In addition, we have seen an increase in weapons funding for a new initiative. Finally, six MPA scientists submitted compelling Early Career proposals to DOE-BES.

With the New Year, Dave Teter (MST-DO) and I have started the planning for our next Materials Capability Review, which is scheduled for May 7-10. The review committee, whose membership is much the same as last year, will be led by Barbara Jones of IBM Almaden. We are organizing the review around two of the Areas of Leadership for the Materials Pillar: Materials Dynamics (led by Mike Stevens, WX-DO) and Integrated Nanomaterials (led by David Morris, MPA-CINT). If your research is in one of these two areas, you may be contacted over the next month to present your results at the review.

Alan Bishop, PADSTE, is leading an effort to coordinate and promote the Laboratory's three Science Pillars, which underpin the Laboratory's science and technology base: Materials for the Future (Materials), Information Science and Technology (IS&T), and the Science of Signatures (SOS). Dave Teter and I are leading the ongoing development and planning for the Materials Pillar and are heavily involved in these efforts. As part of this process we are going to be hosting a series of 'Deep Dive' workshops, both in new areas of opportunity for the Materials Pillar and in areas that bridge the Materials Pillar and one or both of the other Pillars. The first of these workshops will be held in late January on the topic of mesoscale science (www.meso2012.com/), in anticipation of a DOE-BES call in FY14 for centers addressing opportunities in mesoscale science. We are also anticipating a Deep Dive workshop in February or March on Advanced Manufacturing, addressing the opportunity offered by the new National Network for Manufacturing Innovation (manufacturing.gov/nnmi.html) that will potentially enable funding for 15 manufacturing innovation institutes around the country. Finally, we are in discussions with the IS&T Pillar on a joint Deep Dive Workshop on modeling and analysis focused on materials.

Finally, those of you who are residents in the MSL have certainly noticed that construction is now underway to renovate the MSL "infill" in the NE corner, second floor of the MSL. Specifically, this space will be transformed into a 6,000-square-foot synthetic chemistry laboratory enabling our materials chemistry colleagues in MPA-MSID to move from TA-48 to the Materials Science Complex and allow the space at TA-48 to be used to fulfill the requirements of an important sponsor by C Division personnel. We thank all of the residents of the MSL for their patience during this period.

MPA Division Leader Toni Taylor

From Andrew's desk . . .

As many of you know, our group has undergone some significant reorganization over the past year. In March 2012, the Materials Chemistry (MPA-MC) group combined with many staff from the Superconductivity Technology Center (MPA-STC) to form a new group, which was initially called the Materials Chemistry Group. However, the new group performs a diverse set of research that ranges from molecular and materials synthesis to device fabrication and testing. As a group, we decided to change our name to the Materials Synthesis and Integrated Devices (MPA-MSID) group to better describe our current scientific breadth and diversity. While the group name has changed, we continue to perform fundamental basic research, as well as solve technical problems, throughout the Laboratory's missions, including energy security, nuclear deterrence and global threat reduction. The group's work has a number of primary program sponsors including DOE-BES, DOE-EERE, LDRD, Chevron and the weapons program.

As with any reorganization, some new challenges have arisen as well as new opportunities. We continue to work through the challenges of integrating the new group members into a more cohesive and collaborative unit. I believe that the scientific diversity in the group will lead to some promising new research directions as we combine our abilities to make new materials with our strength in incorporating them into integrated devices to solve customer needs. I believe this scientific breadth will help us find and generate new funding opportunities in the future.

As we look forward to 2013, we are excited by the opportunities that new lab space at the Materials Science Laboratory and the Research Park may bring. The lab space at the MSL is currently under construction and should be opened to us in June 2013. This space has been designed for synthesis and characterization of materials, although there is some flexibility in the space for future capability growth as well. While the lab space renovation at the Research Park has not begun yet, it is scheduled to be finished before the end of September 2013. This space has been designed to house the Carbon Capture and Separations for Energy Applications team led by Kathryn Berchtold. Once these spaces open many of the MSID scientists will be located in close proximity to other MPA groups located at TA-3. I believe this proximity will also help us foster new collaborations within the Division to continue to grow new programs.

So, while there has been some significant changes in the group, our group members continue to lead strong science-based programs, which will soon be done in part at new facilities that will hopefully promote new opportunities in the coming years.

MSID Group Leader Andrew Dattelbaum

" *I believe that the scientific diversity in the group will lead to some promising new research directions...* "

Andrew

Joyce cont.

For 16 years, Joyce hammered away at decades-old issues surrounding plutonium metals and oxides. Now, a host of new questions are brewing. “There are many unsolved problems in plutonium science, from understanding superconductivity in plutonium compounds, to hybridization in plutonium oxide bonding, to hydrogen in the plutonium metal stockpile,” he said.

The nation’s stockpile of nuclear weapons, for instance, contains more hydrogen than originally believed. By understanding how plutonium behaves with other materials and how it ages, scientists will better understand what must be done to preserve nuclear weapons and manage plutonium in storage.

Finding reward in unique research

After steeping himself in photoemission research as a doctoral student at the University of Wisconsin-Madison, Joyce joined Los Alamos in 1990. Alongside the late Al Arko, who launched the photoemission program, Joyce and Kevin Graham designed and built instruments for a new lab. The Laser Plasma Light Source (LPLS) was certified for plutonium operations in 1996. Now principal investigator on the project, Joyce is the recipient of a Los Alamos Distinguished Performance Award and two Los Alamos Achievement Awards for his leadership of the program.

Joyce stands out “as one of those scientists who value hard work and merit,” his colleague Tomasz Durakiewicz said. Durakiewicz, who joined the program in 2000, played a major role in upgrading all the lab’s components and expanding the range of experiments the lab is used for, Joyce noted.

Though tucked away in a nondescript building, LPLS is nothing short of a treasure. Yellow doors and a traffic-light-like signal alert entrants to the use of laser radiation inside. Equipped nearly to the ceiling with special instruments, the lab houses the world’s only angle-resolved photoemission spectroscopy instrument dedicated to transuranic materials, allowing scientists to investigate a material’s electronic structure, in energy and momentum. The lab also boasts the world’s only tunable light source for transuranic research.

“There’s something rewarding about doing research that’s unique in the world, measuring something no one else can measure, writing about it, talking about it,” said Joyce.

Joyce’s team used to spend as many as 12 weeks of the year at the nation’s synchrotrons, scouring the electronic structure of a broad smattering of actinides. With the heightened emphasis on plutonium, however, the team spends more time at LPLS. Synchrotrons don’t allow photoemission experiments on plutonium samples—the samples can’t be encapsulated, thereby posing the costly risk of storage ring contamination—so LPLS is an inexpensive tool that gets the job done, Joyce said.

For Joyce, the Laser Plasma Light Source is also a refuge. If he feels flattened by fundraising and paperwork, he said he ducks into his lab and comes out refreshed.

John Joyce’s Favorite Experiment

What: Electronic structure of plutonium dioxide

When: 2010 to present

Where: Laser Plasma Light Source Laboratory

Who: John Joyce, Tomasz Durakiewicz, and Kevin Graham (all MPA-CMMS); synthesis team led by Mark McCleskey (formerly Materials Chemistry, MPA-MC); theory team led by Rich Martin (Physics & Chemistry of Materials, T-1)

Why: We wanted to test a prediction made by our theory colleagues that hybridization in PuO_2 would be stronger than that in UO_2, even though the 5f electron wave functions are smaller.

How: A great test of hybridization in solids is the observation of momentum dependence in the electronic structure; it means the electrons are shared between different sites in a crystal. To demonstrate hybridization in PuO_2 we needed to perform angle-resolved photoemission (ARPES) experiments. We had just finished a few years of developing plutonium APRES competency at Los Alamos National Laboratory. In addition to our spectroscopic capability, we needed single crystal samples of PuO_2. These samples were recently developed at LANL using polymer-assisted deposition (PAD), providing the first single-crystal, thin-film PuO_2 samples.

The a-ha moment: We conducted the first ARPES experiments on PuO_2 using PAD samples. The results showed strong hybridization between the plutonium and oxygen energy levels. The experiment gave order of magnitude increase in hybridization between PuO_2 compared to UO_2, which is nice since we don’t have to argue about fine details in analysis with order of magnitude changes. Together, the ARPES team, the synthesis team, and the theory team made a unique discovery in plutonium electronic structure, which also marks the beginning of a new and productive competency in plutonium research at LANL.

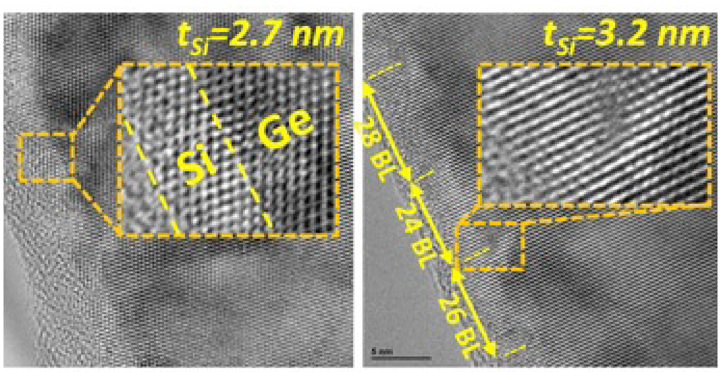
CINT scientists measure coherency limits for strain relaxation in nanowires

Using germanium/silicon (Ge/Si) core/shell nanowires, Shadi A. Dayeh and S. Tom Picraux (Center for Integrated Technologies, MPA-CINT) have demonstrated experimentally that the critical thickness for heterostructure growth can be increased by as much as three times in nanowires when compared to planar Ge/Si films.

Such nanowire heterostructures offer new opportunities to improve the performance of semiconducting devices by using the stain engineering to enhance charge carrier transport and photoemission properties. However, growing such dislocation-free heterostructures to the right thickness to be useful for device applications has been challenging.

Here, the workers identify for the first time the mechanism by which the strain relaxation occurs, which in turn establishes both the critical thicknesses and strains which can be achieved. This work is of critical importance for advancing the field of nanoscale semiconductor heterostructures to fully exploit their potential in improving optoelectronic device performance. Earlier theoretical predictions of the coherency limits were uncertain and the mechanisms by which strains relax in these nanoscale heterostructures were not properly identified.

As a consequence of core/shell strain sharing in nanowires, a 16-nm radius Ge nanowire with a 3-nm Si shell is shown to accommodate 3 percent coherent strain at equilibrium, a factor of 3 increase over the 1-nm equilibrium critical thickness for planar Si/Ge heteroepitaxial growth, according to the paper, which will be featured on the cover of the May 2013 issue of the ACS journal *Nano Letters*. Smaller Ge radii are expected to offer further increases in the critical thickness.



Transmission electron microscope images showing atomic structure at the left edges of Ge semiconductor nanowires with Si shells before strain relaxation (2.7-nm-thick Si, left panel), and after strain relaxation by insertion of extra Si planes in the shell (3.2-nm-thick Si, right panel).

Collaborators include scientists from universities in Italy, Canada, China, the United Kingdom, and the University of California, Los Angeles.

A portion of the work was performed at the Center for Integrated Technologies, a U.S. Department of Energy, Office of Energy Sciences user facility at Los Alamos National Laboratory and Sandia National Laboratories. The Laboratory Directed Research and Development program funded the Los Alamos portion of the research. This work complements LANL's scientific pillar on new materials for the future and its sustained leadership in the field of integrated functional nanomaterials.

Reference: "Direct Measurement of Coherency Limits for Strain Relaxation in Heteroepitaxial Core/Shell Nanowires," (*Nano Letters*, on website, As Soon As Publishable article, dx.doi.org/10.1021/nl3022434).

Technical contact: Shadi Dayeh

New synthesis method improves catalysts for Li-O_2 battery

In research that bolsters the development of a next-generation energy storage device for automotive applications, Los Alamos scientists have developed a new synthesis method that overcomes the electrochemical reaction limitations found in traditional catalysts.

By in situ synthesizing nitrogen-doped, graphene directly from heteroatom polymer with controllable morphology and doping functionalities, the scientists developed a graphene-rich catalyst. Compared to traditional carbon black and platinum/carbon catalysts, it offers superior oxygen reduction reaction (ORR) activity and better performance as cathodes in nonaqueous Li-O_2 battery systems.

The lack of a cost-effective, efficient ORR catalyst is a main obstacle in developing a variety of electrochemical energy storage and conversion technologies, such as low-temperature fuel cells and metal-air batteries. Nonaqueous Li-O_2 batteries have gained attention because of their much-improved energy density capabilities, thanks to their unique battery chemistry compared to traditional Li-ion batteries.

In research published in *ACS Nano*, Los Alamos scientists and their University of South Carolina collaborator

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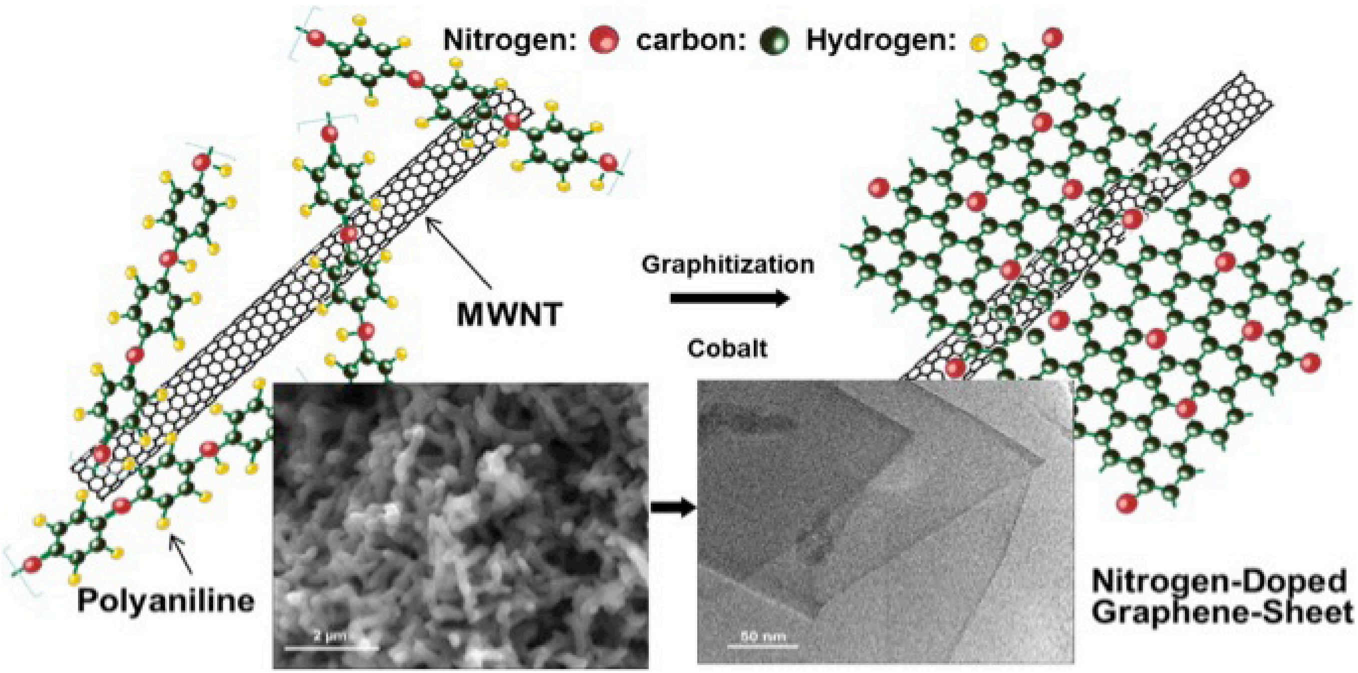

Scheme of the formation for nitrogen-doped graphene sheets derived from polyaniline

Synthesis cont.

subjected an aromatic-rich heteroatom polymer (PANI) to a graphitization process, with the catalysis of a cobalt species using multiwalled carbon nanotubes (MWNTs) as a supporting template. In particular, they discovered that an optimal temperature for heat treatment during synthesis is critical to creating a high-surface-area catalyst with favorable nitrogen doping.

Los Alamos researchers include Gang Wu (Sensors & Electrochemical Devices, MPA-11), Nathan Mack (Physical Chemistry & Applied Spectroscopy, C-PCS), Wei Gao (MPA-CINT), Ruiqin Zhong (formerly MPA-MC), Jiantao Han (Lujan Center, LANSCE-LC), Jon K. Baldwin (MPA-CINT), and Piotr Zelenay (MPA-11).

The Los Alamos National Laboratory Early Career Laboratory-Directed Research and Development Program supported this work.

Reference: “Nitrogen-doped graphene-rich catalysts derived from heteroatom polymers for oxygen reduction in nonaqueous lithium-O_2 battery cathodes,” *ACS Nano*, Article ASAP, DOI: 10.1021/nn303275d.

Technical contact: Gang Wu

A new method: Table-top measurement of the magnetic field penetration depth in superconductors

A Los Alamos team and collaborators from Brookhaven National Laboratory developed a “table-top” method to determine the absolute value of the penetration depth of the magnetic field into superconductors (commonly denoted as λ), an important fundamental property of superconducting materials pivotal for both basic understanding of the superconducting phenomena in a particular material as well as for superconducting applications.

Up to now determination of absolute value of λ was possible only via expensive and time consuming µSR (muon spin rotation) experiments at large international Muon Spin Spectroscopy facilities. The experimental apparatus developed at Los Alamos could have a dramatic impact on the field, with orders of magnitude reduction in experimental time and costs.

Roman Movshovich and Leonardo Civale (MPA-CMMS) led the scanned-probes effort. The experimental approach was spearheaded, developed, and implemented by Jeehoon Kim, a postdoctoral research associate in MPA-CMMS.

The work was featured in November on the cover of *Superconductor Science and Technology*. The figure shown

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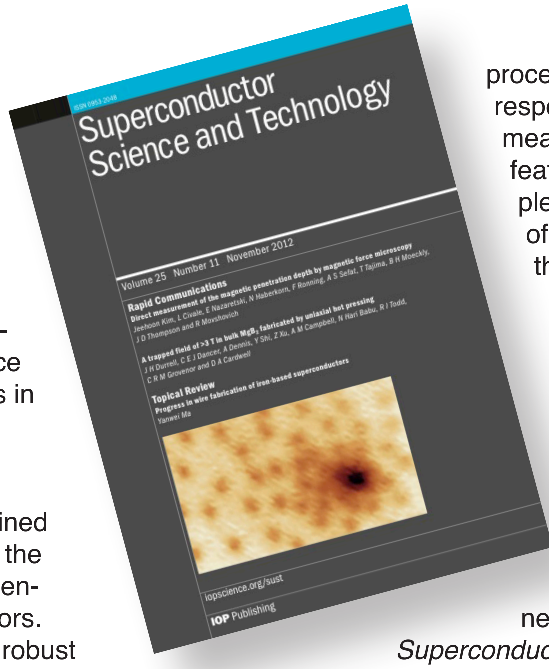
Table-top cont.



is part of a larger illustration of magnetic force microscope (MFM) to measure magnetic field penetration depth into a superconducting Nb film. As the magnetic tip approaches a superconducting sample, it experiences a repulsive Meissner force induced by the shielding currents in the sample that screen the magnetic field of the tip.

In the paper, the scientists explained how they used MFM to measure the absolute value of the magnetic penetration depth λ in superconductors. They obtained λ in a simple and robust way without introducing any tip modeling procedure via direct comparison of the Meissner response curves for a material of interest to those measured for a reference sample. Their apparatus features simultaneous loading of multiple samples, and it allows straightforward measurement of the absolute value of λ in superconducting thin film or single-crystal samples.

The research team also included Filip Ronning and J.D. Thompson (MPA-CMMS), Tsuyoshi Tajima (Mechanical Design Engineering, AOT-MDE), and Nestor Haberkorn (formerly of the Superconducting Technology Center, MPA-STC).

Reference: "Direct measurement of the magnetic penetration depth by magnetic force microscopy," Rapid Communication, *Superconductor Science and Technology*, **25** 112001; doi:10.1088/0953-2048/25/11/112001. Work at LANL was supported by the U.S. Department of Energy, Basic Energy Sciences, Division of Materials Sciences and Engineering (MFM, data analysis and manuscript preparation), and by Tajima's 2010 DOE Early Career Award (SQUID measurements). Yongqiang Wang (Materials Science in Radiation and Dynamic Extremes, MST-8) performed the RBS measurement. The research supports the Lab's Energy Security mission area and the Materials for the Future science pillar.

Technical contacts: Roman Movshovich, Leonardo Civale, and Jeehoon Kim

Technique	Absolute value of MPD	Sample shape bulk/film	Local probe	Temperature range	Number of samples measured	National national facility or "table top"	Time per experiment
μSR	yes	bulk	no	> 50 mK	one	NF	weeks
Resonant cavity	no	bulk	no	> 1.2 K	one	TT	weeks
Scanning SQUID	no	bulk to thin film	yes (~μm)	> 380 mK	one	TT	weeks
TDO	no	bulk	no	> 50 mK	one	TT	weeks
Mutual inductance	yes (fitting)	thin film	no	> 1.2 K	one	TT	weeks
Existing MFM "Meissner"	yes (fitting)	bulk	yes (~nm)	> 4 K	one	TT	weeks
Proposed MFM "Meissner"	yes	bulk to ultrathin film	yes (~nm)	> 20 mK	more than ten	TT	few hours

Table 1. Comparison of various techniques for measuring MPD.

Jaqueline Kiplinger named Organometallic Subdivision chair-elect of American Chemical Society division

Jaqueline L. Kiplinger (Materials Synthesis & Integrated Devices, MPA-MSID) will serve as the chair-elect for the Organometallic Subdivision of the American Chemical Society's division of Inorganic Chemistry. She will participate in Division Executive Committee meetings held at the Spring (April) and Fall (September) ACS National Meetings, following which she will become the chair. She will act as a liaison between the division and the organometallic community in general, proposing symposia for future ACS meetings as well as communicating opportunities for division support for conferences of organometallic interest. The division of inorganic chemistry represents a diverse body of scientists—organometallic, bioinorganic, solid-state, materials, nanoscience, and coordination chemists—who come together

continued on next page

Kiplinger cont.

to understand and promote the richness of the chemistry of the elements. It sponsors several educational programs and awards, including the ExxonMobil Award in Solid-State Chemistry, the Inorganic Nanoscience Award, the Young Investigator Symposium Award Program, the Undergraduate Inorganic Chemistry and Travel Award Programs, and the new Inorganic Chemistry Lectureship.

Kiplinger is internationally recognized as a scientific leader in actinide and lanthanide chemistry. She is a Fellow of the American Association for the Advancement of Science and the Royal Society of Chemistry.

Her work at LANL has been recognized by a 2007 Los Alamos National Laboratory STAR Award, a 2008 Los Alamos National Laboratory Fellows Prize for Research, two R&D 100 Awards (2011 & 2012), three LANL Pollution Prevention Awards and two NNSA Best-in-Class Pollution Prevention Awards (2010 & 2012). In 2010, she was honored with a LANL Distinguished Mentor Award.

Additionally, she has served on the editorial board for the American Chemical Society journal *Organometallics* (2010-2012) and as an alternate councilor for the American Chemical Society's division of inorganic chemistry (2009-2011). She has published nearly 80 journal articles and has received more than 2,100 citations.

Technical contact: Jaqueline L. Kiplinger

Celebrating service

Congratulations to the following MPA Division employees celebrating a service anniversary recently:

Jeffrey Willis, MPA-MSID.................................... 35 years
Fernando Garzon, MPA-11.................................. 25 years
Eve Bauer, MPA-MSID .... 15 years
Rodney Borup, MPA-11 .... 15 years
Cristian Pantea, MPA-11 .... 10 years

HEADSup!

Your MPA-WSST has new members for 2013!

Contact	Phone	@lanl.gov	Organization
Lisa Phipps (Chair)	665-7934	mlphipps	MPA-CINT
Darrick Williams (backup)	665-2081	darrick	MPA-CINT
Marc Janoschek (MPA-CMMS)	664-0776	mjanos-chek	MPA-CMMS
Dwight Rickel (backup)	667-1222	drickel	MPA-CMMS
Steve Ashworth (MPA-MSID)	663-5562	ashworth	MPA-MSID
John Rowley (backup)	663-5592	jrowley	MPA-MSID
Karen Rau (MPA-11)	667-6707	kcrau	MPA-11
Jerzy Chlistunoff (backup)	667-7192	jerzy	MPA-11

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To submit news items or for more information, contact Karen Kippen, ADEPS Communications, at 606-1822, or kkippen@lanl.gov

For past issues see www.lanl.gov/orgs/mpa/materialsmatter.shtml

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It's so easy being green (or is it?)

It's that time of year, when we review our FY12 environmental accomplishments and communicate the ADEPS Environmental Action Plan for FY13. The ADEPS EAP team members are Steve Glick from P Division (the Directorate Point of Contact), Jim Coy from MST, Cathy Padro from MPA, and Frances Aull from LANSCE.

We had another strong year of environmental accomplishments in FY12. A sampling of our accomplishments:

• MPA and P collaborated to implement a short-fuse Pollution Prevention (P2) project to dispose of a total of 6 drums of chemicals, solids, toxic organic liquids, and corrosive liquids containing 204 gallons and weighing 275 kilograms in the "Chemical Cleanout" project.

• Four successful Helium Recovery projects were implemented at MPA's NHMFL, resulting in up to 72,200 liquid liters of helium recycled/re-used with a predicted annual savings of over $1.44M.

• In our efforts to reduce, eliminate, or reclaim sulfur hexafluoride (SF6), an extremely potent greenhouse gas, MPA fully removed its small amount of SF6, LANSCE-LC and MST (using a closed-loop system) are recycling the small amount that they use—and LANSCE plans to only keep one small cylinder for research purposes, if ever needed. P Division has the largest inventory of SF6; our FY13 EAP will include a target to address potential solutions to reducing P Division SF6 inventory.

• The MPA Methanol Recirculation and Recovery Loop (MRRL) project (from FY11) received one of the five top prizes, the "Star Award," in the P2 competition. The ADEPS EMS Team received a Bronze Award for its active involvement in the successful LANL "Recycle/Reuse" event. In addition, LANSCE received a P2 award for recycling of over 100,000 pounds of legacy metals.

• All divisions had extremely successful efforts to salvage unneeded equipment in a number of cleanout activities. Pallets full of electronic equipment were properly salvaged, as were 2 recycling bins filled with recyclable paper and books, boxes of cables, miscellaneous tools, and components. P Division's complete and total clean-out of the basement experimental area in 03-216 resulted in the removal of at least 30 years worth of collected equipment, materials, and chemicals. LANSCE disposed of 3 roll-off bins of metals for recycling, 1 refrigerator, 16 bins of recycled paper from office clean-outs, and 15 boxes of office supplies.

• We continue to improve on our goal of all managers performing at least 1 environment-related MOV per quarter. In FY12, over 61% of ADEPS managers met or exceeded that goal, with an overall average of >6 environmental MOVs per manager per year.

Environmental management will always be an ongoing effort. Our 2013 Environmental Action Plan addresses our impact on the environment and outlines steps we can take to reduce our impact and decrease the potential for and severity of any environmental damage.

In keeping with the three-pronged approach established in FY12, we have three objectives: Clean the Past; Control the Present; and Create a Sustainable Future. These objectives parallel the LANL institutional objectives, with the targets fine-tuned to fit our Directorate's needs.

Clean the Past: ***reduce environmental risks from historical operations, legacy and excess materials, and other conditions associated with activities no longer a part of current operations.***

Target 1: Focused inventory on out-of-date peroxide formers to ensure proper testing and potential disposal pathways
Target 2: Observe current institutional procedures for proper handling and transfer of research samples when the originator leaves the Lab.
Target 3: Reduce surplus equipment, chemicals, materials through effective salvage operations, reuse, and recycling.

Control the Present: ***control and reduce environmental risks from current, ongoing operations, missions, and work scope.***

Target 1: Managers will conduct at least one environmentally-focused MOV in each quarter
Target 2: Communicate environmental objectives
Target 3: Perform annual chemical inventories (90% of ChemLog entries inventoried)
Target 4: Complete MPA-11 P2 oil pump replacement project

Create a Sustainable Future: ***support institutional development and maintenance of high performance sustainable buildings and reduce or eliminate the use of SF6 by recycle/reuse or replacement activities.***

Target 1: Maintain a supporting role with local FODs and Utilities & Institutional Facilities to meet HPSB objectives for building 03-1415.
Target 2: SF6 reduction, elimination, and/or reclamation

We need you to turn off lights in offices, conference rooms, hallways, and labs when not in use. Get that leaking faucet/toilet/urinal fixed (contact your facilities coordinator). Turn off computer peripherals when not in use. Alter your purchasing habits–Purchase GREEN. Use the blue and green recycling bins. Share chemicals, minimize chemical inventories, purchase safer alternatives, recycle, and dispose properly. Salvage all unnecessary or unused (and not needed) equipment. Nominate a deserving colleague for a P2 Award!!

Document, Record & Report all significant environmental actions that you take that positively affect the environment. Remember, if it's not recorded, it didn't happen. Please send your environmental action updates to your Division's EAP contact (MPA: Cathy Padro at padro@lanl.gov; MST: Jim Coy at jcoy@lanl.gov; LANSCE: Frances Aull at aull@lanl.gov; P: Steve Glick at sglick@lanl.gov). This will ensure that our Directorate continues to get the recognition it deserves for our environmental efforts.

Cathy Padro, MPA representative for ADEPS EAP

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